DIGITAL DIVIDE REMEDIATION
AN AUSTRALIAN INDIGENOUS COMMUNITY CASE STUDY

Andrew Turk[1]

Abstract

The digital divide is a key area of concern within the emerging field of social informatics, especially for 'wired communities' aspects of community informatics. In developed postcolonial nations such as Australia, its impact is strongest in Indigenous communities. E-government initiatives can widen the divide but can also facilitate Digital Divide Remediation (DDR). This paper reports on a case study in Roebourne, in the Pilbara region of Western Australia, where the vast majority of the community are Indigenous Australians. The study examines how the community is trying to use government grants to access resources to establish a telecentre and associated infrastructure. The paper critiques the grants-based approach to addressing digital divide issues in this type of community for its lack of efficiency, effectiveness and equity, and proposes a Digital Divide Remediation Model (DDRM) as a way of facilitating more appropriate approaches.

Introduction

There is growing recognition of digital divide (DD) issues around the world (Benton Foundation 1996, Birkerts 1998, Dutton 1999, Kling 1996, 1999, NTIA 1999, Venkatesan et al. 2002).[2] This may be considered as an important part of the larger research field of social informatics (Kling et al. 2000).

There is a need to address DD issues so as to foster development, especially in disadvantaged communities. Information and communication technologies (ICTs) play a vital role in both economic and social development. For instance, the recommendations of the European Commission Directorate General V Report (Employment, Industrial Relations and Social Affairs) in its 1996 Green Paper include:

> Public policy should…
> 2. Improve democracy and social justice by ensuring that the potential of Information and Communication Technologies (ICTs) to provide relevant, up-to-date, information on matters of common interest and to enable citizens to participate in public decision making, are fully supported by governments, with the involvement of non-governmental organisations…

> 4. Overcome the disadvantages faced by disadvantaged social groups, and ensure that those who currently lack opportunities in society have the possibility to master ICTs and to thereby improve their relative position, rather than become further disadvantaged (Sections 126, points 2 & 4).

These concerns by governments and intergovernmental bodies are also reflected in the priority given to digital divide remediation (DDR) by non-government organizations (NGOs). NGOs are increasingly realizing that DDR facilitates many aspects of economic and social development. This view is also held by national, regional and local community organizations, by academic researchers and by the general public.

There is a trend towards collective action to address shortcomings in approaches to addressing DD issues. For instance, somos@telecentros is a network of telecentres in Latin America and the Caribbean. The Somos@telecentros Virtual Community is part of the TELELAC (Latin American and Caribbean (Telecentro/Telecenter) Network) Project which is co-ordinated by the Chasquinet Foundation (Quito, Ecuador) and supported by the International Development Research Centre (IDRC, Canada). This organization seeks to set up co-operative mechanisms to facilitate action research involving community members and to develop more effective models for telecentre development.[3] Issues of interest include approaches to the development and maintenance of telecentres and how these relate to governmental, economic and social processes.

In developed postcolonial countries such as Australia, Canada, New Zealand and the United States, the impact of DD issues is perhaps greatest in Indigenous communities (Brady 2002, Kamira 2002, McKinnon 2002).[4] They are also of significance for developing countries which include disadvantaged Indigenous groups (Harris et al. 2000).

Riley, Nassersharif and Mullen (1999) carried out a very detailed examination of the impact of DD issues on Native Americans. They consulted widely with Indigenous and non-Indigenous stakeholders and developed a set of recommendations about policies and processes of remediation. In their executive summary they state that:

> By just about any measure used, individuals living in Native communities or villages typically have less income, receive less education, and suffer from higher unemployment and poverty than individuals in non-Native communities. Native communities also lag far behind non-Native communities in 'basic' infrastructure such as roads, utilities, and housing. The gap between Native and non-Native communities is even greater in 'advanced' technology infrastructure such as Internet access, cellular telephone service, and cable TV (Riley et al. 1999, pp. v–vi).

Riley and colleagues identified the most important barriers to development of technology infrastructure in Native American communities as:

- The generally weak economic base…that prevents them from investing in either physical infrastructure or worker training necessary to support technology infrastructure;
- Geographical remoteness that raises the cost of providing technology infrastructure;
- Distrust on the part of some Native Americans of specific new technologies and of federal assistance;
- Lack of an integrated interagency…investment strategy;
- Federal policy that fails to reflect the severity of technology gaps…;
- Insufficient information dissemination regarding available federal programs…; and
- Insufficient planning in Native communities (Riley et al. 1999, p. vii).

The situation for Indigenous Australians is very similar. State and federal governments are starting to provide programs aimed specifically at DDR in Indigenous communities, e.g. under the Networking the Nation program. Indigenous organizations such as the Outback Digital Network[5] are also taking a lead in developing infrastructure and services in a culturally appropriate manner (Hodge 2002).

As well as the strong impact of DD issues arising from the socioeconomic status of Indigenous communities, there may well be complex matters relating to the nature of digital knowledge and decision systems: for example, fundamental cultural issues relating to their ontology and epistemology (Turk & Trees 2000, Watson-Verran & Turnbull 1995).

Addressing Digital Divide Issues in Western Australia

The DD issues common to developed nations apply strongly in Australia. This is partly because of its size and its thinly distributed pattern of settlement, with a concentration of population in about a dozen coastal cities and very large distances between small rural and remote communities. There are also significant issues regarding Indigenous Australians who suffer from much higher unemployment, lower education and incomes, and poorer health.

The impact of DD issues in rural and remote communities has increased due to the withdrawal of key service providers from the business sector (e.g. banking) and from federal and state government departments with responsibilities for such matters as health, housing, training and employment, and welfare payments for aged, disability and other pension schemes. Increasingly, businesses and governments want to provide information and services online, assuming that everyone has access to the Internet and can use it. Even when arrangements are made for online access (e.g. through agencies, such as Centrelink), there is seldom funding for staff to assist clients to use the computer systems. Many who are obliged to 'help themselves' to

online information or forms will do so in ineffective ways (requiring repetition) or give up because of lack of skills, fear of the technology or 'shame' at being incompetent. There are of course considerable potential benefits from e-government developments, including making the provision of services more 'seamless'. However, without effective DDR, the accompanying withdrawal of face-to-face facilities is having a significant impact on the delivery of welfare services in rural and remote communities.

Federal and state government agencies started addressing these issues in the late 1980s, often with assistance from academic institutions. Throughout the 1990s telecentre programs were developed and were quite successful in rural areas where there is a predominately non-Indigenous population (Bibby 1999, Reeve 1998, Simpson et al. 2002, Spencer 2002, Venkatesan et al. 2002). A key determinant of success has been the local availability of administrative and technical skills (Donovan et al. 2002).

During the same period, there has been a general political movement at both federal and state levels towards 'smaller government'. The imposition of an ideological framework has emphasised reduced delivery of services by government departments and an increasing push for alternative commercial arrangements, facilitated by specific government grants, with a high level of 'managerialism' and an emphasis on 'governance'. This has had a very significant effect on the nature of programs to address DD issues, the way community groups interact with them, and the outcomes.

There is a confusing array of constantly changing government programs at federal, state, regional and local levels to address DD issues, with less co-ordination and stability than is desirable. Almost exclusively, these government initiatives are handled as grants programs, where organizations are expected to apply for funding for specific types of programs within particular timeframes. A few examples are:

- ***Telecentre Program (Western Australian State Government)***
  This is an ongoing system of government support for the development of telecentres in rural and remote communities in Western Australia. Grants are available to incorporated bodies in suitable communities who apply in an appropriate manner, supplying required information and demonstrating support from community organizations, businesses and local government and a detailed business plan. The telecentre is expected to raise funds for operating costs through sale of services (Internet access, video conferencing, training, secretarial services etc.) and to be self-funding from its fourth year of operation. This program is run by a Support Unit which administers the scheme, co-ordinates interaction with other government agencies (e.g. education providers), provides advice and practical support and maintains the network.[6] This has been a crucial factor leading to the success of most Western Australian telecentres (Oliver & Short 1996, Short 2001). About

ninety-five telecentres have been established, mostly in small rural townships in the agricultural south-west.

- ***First Click Computer Literacy Program (Western Australian State Government)***
  This is a relatively new program aimed at addressing DD issues by encouraging the development of computer skills and familiarity with the Internet among low income households, people in regional areas, the unemployed, including unemployed women aged between 40 and 54. Special consideration is given to the needs of sub-groups including seniors, people with disabilities, Indigenous people and those for whom English is not their first language. Funds are granted to not-for-profit community groups to employ part-time staff but can also be used for hire of rooms, advertising, transportation of senior or disabled students, etc. Applications are assessed as to the appropriateness of strategies or programs to meet the computer literacy learning needs of the target groups, demonstrated experience and skills of the staff/organization working on the project, and anticipated benefits and outcomes.
- ***Rural Transaction Centre Program (Federal Government)***
  This program seeks to address problems arising from the withdrawal of business and government services from rural and remote areas and to make use of technologies such as the Internet and electronic funds transfer. It provides grants for the establishment of rural transaction centres, covering the cost of renovations and other infrastructure, and is meant to complement related government programs at the federal (e.g. Networking the Nation and the Regional Solutions scheme) and state (e.g. Western Australian telecentre scheme) levels. Applications are assessed as to the demonstrated level of needs and the ability of the organization to provide effective service delivery, maintain appropriate records and be financially viable. There are stringent requirements for community consultation, market surveys of needs, and detailed program delivery and financial planning.

There are other government programs relevant to DDR, but these will serve as appropriate examples as they are the major schemes relevant to the case study discussed in this paper.

Roebourne Case Study

Description of the community

My co-researcher Dr. Kathryn Trees and I have been working together for many years with the Indigenous community at Roebourne in the Pilbara region of Western Australia (Trees & Turk 1998, Turk & Trees 1998, 1999, 2000). Much of our recent work has related to DD issues, including assistance with preparing government grant applications.

The Pilbara is a remote and vast region of about 500,000 sq. km. with only a handful of major towns and about a dozen small communities, and a total population of approximately 40,000. Indigenous people (Aboriginal and Torres Strait Islanders) make up about 11.6 per cent of the population, and 25.6 per cent of the total population is under 15 years of age. The main economic activity is mining iron ore and other base metals, and the production of gas, chemical by-products and salt. Tourism, pastoral and aquaculture activities are also carried out and there is some secondary processing, small manufacturing industries and service industries.

Roebourne, established in 1864, was the first colonial town in the Pilbara but since the 1970s it has been overshadowed by new towns constructed for workers in the mining industry. The population of Roebourne and surrounding small communities is about 1,300, of whom 95 per cent are Indigenous. The unemployment rate is 25 per cent, with a further 10 per cent participating in Community Development Employment Program (CDEP) activities ('work for the dole'). Literacy and numeracy levels are low, hindering access to the limited employment opportunities available in nearby larger towns. Most employment is concerned with services such as the TAFE college, schools, shops, hospital and prison. There is a high proportion of people on benefit payments, a large number of elderly people and many young children. Socioeconomic circumstances are almost uniformly low and there is generally poor health. There are few government offices or businesses in Roebourne, and few people have access to transport to visit nearby towns for services.

Commissioner Johnston, in the 1991 Royal Commission into Aboriginal Deaths in Custody report, stated that the Roebourne community suffered severe social and economic deprivation which contributed to the high number of Indigenous people incarcerated. He recommended that they be empowered to develop their own social and cultural infrastructure, with particular attention to education, community cohesion and sustainable economic development.

Historically, the people of Roebourne have been socially and economically disadvantaged by the development of the pastoral and mining industries, through being removed from their traditional country and offered little compensation or employment (Ieramugadu 1995, Rijavec et al. 1995). However, it is a strong, resilient and community-focused town. In the 1990s important developments included improvements in educational possibilities at primary, secondary and TAFE (vocational training) levels. Each was designed to raise the standard of living, improve opportunities for young people, increase the number of commercial enterprises, and emphasize the strong cultural identity of the community. Reconciliation is a strong community focus, with Indigenous and non-Indigenous people working together to provide improved facilities which all will share.

Addressing digital divide issues in Roebourne

The community at Roebourne has been working to address DD issues in a manner which is integrated with related community processes and designed to suit local needs. This is being achieved through a series of co-ordinated projects, focusing on the development of the Roebourne Communication and Collaboration Centre (RCCC), which is a continuation of the processes of renewal initiated in the 1990s. In part, it flows from work on implementing the recommendations of the 1991 Royal Commission, initiated by Kathryn Trees. It also extends earlier research and community development work related to community collaboration processes, cultural awareness training, community information systems and development of local enterprises, in association with the CDEP program. Significant community members requested the researchers to assist them in this DDR project. We travel there five or six times a year, during breaks from teaching duties at Murdoch University.

The principal objectives of the proposed RCCC are to enhance service delivery, encourage community development, and facilitate networking and collaboration between community, business, educational and government organizations. Delivery of some state and federal government services will be co-located with communications, education and networking facilities. The aim is to improve community well-being and to generate employment and business opportunities. There will be a strong focus on youth, education, cultural development and training.

This proposal has been generated by the Roebourne community as one way to drive development from within. Since the vast majority of community members are Indigenous (mostly from the Ngaluma, Injibarndi and Banjima peoples), the centre will be developed in a culturally appropriate manner. It will facilitate greater interaction between community elders and youth in the context of cultural development, especially through the production of material in local languages.

The proposal for the RCCC was developed during a series of community meetings and steering committee meetings over three and a half years. The idea was to start with a telecentre and a rural transaction centre, initially located in an existing building. Community radio, local language materials production and other facilities would be added as a second phase. This concept was developed through extensive and thorough consultation during 2000. Well advertised meetings were attended by people representing a wide cross-section of the community. The concept had very strong support so a public meeting was held which endorsed the proposals and it was decided to form a steering committee.

This steering committee conducted an extensive survey to investigate interest in the proposal. Of 152 individual survey forms returned,

150 were supportive. Local businesses were also very supportive. Twenty-six letters of support were provided by prominent individuals, businesses and community organizations, including the Shire of Roebourne which contributed a member to the steering committee. The committee was formed from a wide cross-section of the community and held meetings open to anyone interested. These meetings were also attended by representatives of government agencies, including the Telecentre Support Unit and the Pilbara Development Commission.

The RCCC will be a multi-purpose community facility comprising four co-located components (business units):

- Roebourne rural transaction centre (RRTC)
- Roebourne telecentre (RT)
- Roebourne Culture and Language Group (RCLG)
- Roebourne Radio and Recording Group (RRRG)

The first two components relate most directly to DDR issues and will be the focus of discussion in this paper. In 2001 the RCCC was designated as a pilot project for co-ordinated funding under the federal government's Regional Solutions program. The RRTC is the subject of a current grant application to the federal government. The RT has already received state government funding and is expected to start operating this year. It will commence operations in its own premises (recently purchased by the Shire), and will be joined by the RRTC, probably also in 2003. Other components will be added as funds for building renovations and development become available.

The proposed activities of the RRTC and RT components of the RCCC include assistance to clients to interact with government agencies providing services such as social welfare payments, employment, health and housing. They will also include telecommunication services (e.g. Internet and video-conferencing) and short training courses in computer applications, administration and business processes. A range of administrative services will be available for community organizations and visiting government officials and professionals (e.g. accountants).

The selection of services and activities has been carried out in close collaboration with government agencies such as the Pilbara Development Commission and Centrelink, and there will be ongoing collaboration in service provision, planning and governance. Most funding is being provided by government grants (Western Australian Telecentre, RTC) and support from the Shire of Roebourne, and there is also considerable in-kind support being provided by the local community. Detailed business planning has taken place with a view to the organizations being self-sufficient within four years, with accountability and good governance being emphasized.

Interaction with co-located activities such as community radio, music/song recording and performance and cultural development will be facilitated via the RCCC organizational structure. There will

also be strong interaction with schools, TAFE, youth facilities and the branch library. The main objective will be to provide efficient, effective and equitable service delivery via utilization of ICT and the use of skilled and sympathetic staff to act as intermediaries between clients/customers and government agencies. Priority will be given to hiring staff from within the community to ensure a culturally appropriate style of operations. Training of CDEP workers will be a key feature, as is development of administrative and business skills by community members, via specific courses and on-the-job training.

The establishment of the Roebourne telecentre has been the most straightforward of the grants-based procedures, with an effective set of support structures provided by the State Government's Telecentre Support Unit. Funding was approved in May 2001. However, there has been difficulty with the role of local government and it has taken considerable community effort to get the facility up and running. Problems in obtaining a suitable building have further delayed the opening.

The rural transaction centre program has had a set of changing requirements and has only had effective support structures (including field officers based in regions) for the past year and a half. Recent interactions with the agency have been much more effective and the Roebourne community is expecting funding under this scheme to be confirmed shortly. The Regional Solutions Program included a bold effort to co-ordinate activities of more than a dozen federal agencies but seems to have had major problems. The community learned in mid-2002 that its application (from 2000) had been 'lost', despite the RCCC having been designated as a pilot project to trial the development of improved procedures.

The application under the First Click computer literacy scheme was unsuccessful, despite meeting all the criteria. Apparently this was because the legal incorporation process for the telecentre was not yet completed. It is hoped that a future funding application will be successful.

In summary, it has taken over three and a half years of community meetings, negotiations with government agencies and grant applications to start to see significant action to address the DD problems in Roebourne. It will probably take another year or two before the basis of an effective infrastructure is in place and a reasonably complete set of services is established. That is, by the time an effective DDR infrastructure is available, assuming that this is ultimately achieved, it will have taken about five years of community effort. The process would have been even longer if the community had not had access to external expertise via the university-funded research project.

The project has been impeded by a number of systemic difficulties, including:

- working within the grants-based, business-model funding arrangements of government agencies;

- interacting with federal, state, regional and local levels of government across a range of administrative function areas;
- carrying out extensive consultation and collaboration in the face of some competition for resources and community politics;
- having enough people with the necessary skills to conduct surveys and to prepare business plans, detailed program proposals and grant applications.

The experience of the researchers in working with the Roebourne community has led to the development of a set of conclusions regarding the appropriateness of current government policies for addressing DD issues. These are summarised below.

Critique of Government Grants-Based Approaches

A number of problems flow from the adoption in Australia at both federal and state levels of a competitive, business-oriented, grants-based model of DDR. This critique is based on an analysis of the approach as to its efficiency, effectiveness and equity, in the context of how well DD problems are addressed for Indigenous communities such as Roebourne. The approach has serious shortcomings for both communities and government. Turk (2000) provides a detailed critique as to their inefficiencies, ineffectiveness and inequity compared with an alternative model.

There are also advantages in the grants-based approach adopted by governments. For instance, it assists government agencies to gauge the level of local commitment and to use this as a selection criterion. However, these advantages are greatly outweighed by the disadvantages discussed above. There are more efficient, effective and equitable ways of assessing community commitment. In addition, there are ways of involving communities in developing and implementing programs other than via a grants-based, business-model approach. Engaging effectively with community processes and adapting government programs to local needs is feasible in the context of a greater government responsibility for service delivery. It needs more creativity, staff training and leadership, compared with the easy option of managerialism and the passing of governance responsibilities to those least able to cope with them. Inter- and intra-community organizations can play a key role in developing sustainable solutions.[7]

This call for more direct government involvement in DDR is not a suggestion that local involvement should be diminished. This is the key to success, and it is critical that local enthusiasm should not be wasted through ineffective government processes. Studies of the development of DDR approaches in Australia (e.g. telecentre programs) have demonstrated that emphasis should be placed on the human resources, social capital and community organizations aspects (Donovan et al. 2002, Simpson et al. 2002, Venkatesan et al. 2002). Describing the development of a network of community enterprise

centres in western Victoria, James and Ziebell (2001) emphasize the importance of involving the community in defining needs and implementing solutions.

This community-based approach means that if DDR is to be successful it must build on existing community social infrastructure. Hence, a first step is to develop an understanding of the nature of community culture and social processes. This is in line with general recommendations regarding community informatics projects (Turk & Trees 2000).

A More Appropriate Approach to Digital Divide Remediation

A more appropriate approach is to develop a contingency-based method of DDR to be carried out by government agencies in close collaboration with community organizations. Agencies would take greater responsibility for managing the process and would not rely upon community groups applying for grants. They would co-ordinate their activities much more effectively and decide which level of government (probably state) and which particular department/ministry would be the prime manager (lead agency) of the process. Fragmentation and duplication of effort is one of the major problems with the current system. Government expertise and resources need to be pooled, so that some levels of government are merely involved in providing resources, while others are responsible for managing the process and/or directly carrying out remediation activities on the ground.

Once a lead agency was designated for a particular geographic area (say, a State or a region), a more structured approach could be applied. A possible method of implementing an improved approach to DDR would involve developing a (contingent) Digital Divide Remediation Model (DDRM). The first stage would involve identifying the most important causal relationships, in collaboration with key stakeholders. This would be followed by the development of a contingency model for determining an appropriate DDR plan for any particular community, based on prevailing factors relating to difficulties and appropriate solutions.

Such a model could then be used to assess needs and opportunities. Co-ordination committees in each community would collect information to establish baseline data, including DD incidence and remediation contingency factors, and existing resources and processes. A detailed DDR plan could then be developed (in collaboration with the community co-ordination committee) by applying the data to the contingency model. This would enable the identification of a timetable for proposed DDR activities, resource requirements and responsibilities of government agencies and community groups. It would also be necessary to establish clear procedures for monitoring and auditing processes and outcomes.

The next step would be the provision of support to particular communities in accordance with priority ranking, resource availability and community readiness as indicated by the DDRM. The lead agency would monitor progress and revise the plan as necessary, in collaboration with the local co-ordination committee, then assess outcomes with respect to previously collected baseline data.

The final phase would involve auditing the processes and outcomes and revising the DDRM. Collected data regarding the conduct of DDR processes in each community would be used to revise the DDRM factors and measures. The procedures used and results achieved could be routinely discussed with groups representing people impacted by DD, other government and non-government agencies working in related fields, and academic researchers. Reports could be published detailing the procedures, workings of the DDRM and audit results.

Service delivery would still be the prime responsibility of the local community; however, the process of establishing the DDR plan (including responsibilities and resource allocations) would be undertaken by the lead agency in a timely manner. The DDRM and the set of procedures for applying it would become increasingly more efficient, effective and equitable as feedback from experience in dealing with communities is used to enrich and revise the process. It is termed a contingent model since the DDR plans derived from the use of the DDRM will be contingent upon the prevailing conditions (as expressed by the factors and measures) in any particular community.

Much more work is required before a fully developed DDRM could be produced, including identification of relevant factors affecting choice of projects and their outcomes (Simpson et al. 2002, Spencer 2002). Measures would also need to be established for each factor. This could commence with fairly general and informal assessments and become more rigorous with experience and research. Of course, some factors will be more important in particular circumstances than others, hence some form of weighting schema may need to be applied. The important thing is not to concentrate on the inadequacies of a particular initial model, but on the general process of trial, evaluation and improvement of the DDRM.

Identification of the need for such a DDRM is a direct result of research fieldwork as well as a literature review. The findings of the case study indicate that, if such an approach had been applied in Roebourne rather than a grants-based one, effective DDR would have been in place many years earlier and with much less waste of effort by community members and government agencies. Government needs to take a more active role, in collaboration with community organizations, to provide effective DDR for Indigenous communities in developed countries (Riley et al. 1999). This approach is also likely to be effective in developing countries (Pradhan & Metcalfe 2001). It is not dissimilar to the approach proposed in some Latin American countries

for the selection of telecentre sites (Goussal & Udrizar Lezcano 2000). These authors support the use of 'impact-driven criteria' as well as 'feasibility criteria', together with processes to identify the needs of particular communities.

Conclusions

The importance of DD issues, especially for Indigenous peoples, needs to be further investigated and discussed. Governments need to be well informed about the problems and to work with local communities, groups representing disadvantaged citizens, academic researchers and others to develop more effective programs of DDR. In countries such as Australia, this needs to be done in a co-ordinated manner between the various levels of government.

The case study discussed in this paper has detailed the type of processes involved in DDR in an Australian Indigenous community and some of the difficulties they face. The project has provided the author with the experience needed to formulate specific proposals for improved government engagement with this issue. It has led to the formulation of the proposed DDRM-based process which should result in greater project efficiency, effectiveness and equity and more appropriate and lasting outcomes.

This paper has sought to highlight some of the problems of DDR schemes being based on competitive grants to 'business-like' community organizations. Especially in Indigenous communities, this makes impossible demands on participants, lessens the likelihood of successful outcomes and leads to huge delays in addressing urgent social and economic problems. The current approach serves, perhaps, short-term political objectives but does not resolve long-term difficulties. An approach based more on government service delivery is needed. This is not to say that it should not involve considerable consultation and participation by local community members—quite the reverse. The challenge is for government agencies to develop creative, innovative and timely programs which suit community needs and skills, have appropriate levels of governance and work effectively to reduce the impact of DD. Properly implemented, such approaches will increase community 'ownership' of DDR projects and provide for enhanced process transparency and accountability.

[1] The author would like to gratefully acknowledge the assistance of his co-researcher, Dr Kathryn Trees, the members of the community at Roebourne (especially Marshall and Beth Smith) and the personnel of various government departments who have tried their best to assist in addressing DD issues, despite the systemic problems discussed in this paper.

[2] There are also a number of Websites, including http://www.bridges.org/resources/practical.html, http://www.col.org/telecentres/ and http://www.itcd.net/itcd-2001/papers/papers.html

[3] See http://www.tele-centros.org/english/new/index.html
[4] See http://www.indiantech.org/
[5] See http://www.newconnections.gov.au/Article/0,,0_2-1_1-2_5-3_130-4_25776,00.html, http://www.geocities.com/the_odyssey_group/odn02.html and http://www.balkanu.com.au/projects/telecommunications/ digital.htm
[6] See http://www.telecentres.wa.gov.au/
[7] For example, see http://www.sustainability.dpc.wa.gov.au/CaseStudies/communityinternethour/communityinternethour.htm

References

Benton Foundation (1996), *A Nation of Opportunity: A Final Report of the United States Advisory Council on the National Information Infrastructure*, http://www.benton.org/Library/KickStart/nation.home.html

Bibby, A. (1999), 'Telecentres in Rural Australia', *Teleworker Magazine*, http://www.eclipse.co.uk/pens/bibby/oz.html

Birkerts, S. (1998), 'Into the Electronic Millennium', in R. Holeton (Ed.), *Composing Cyberspace: Identity, Community and Knowledge in the Electronic Age*, Boston, McGraw Hill.

Brady, F. (2002), 'Pilot of Locally Based Technical Support for Remote Indigenous Communities', in S. Marshall, W. Taylor & C. Macpherson (Eds), *Proceedings of the Information Technology in Regional Areas Conference (ITiRA 2002)*, Rockhampton, Central Queensland University.

Donovan, R., Gooley, A., Taylor, W. & Tharp, K. (2002), 'Community Technology Centres: Builders of Social Capital?', in S. Marshall, W. Taylor & C. Macpherson (Eds), *Proceedings of the Information Technology in Regional Areas Conference (ITiRA 2002)*, Rockhampton, Central Queensland University.

Dutton, W.H. (1999), *Society on the Line: Information Politics in the Digital Age*, Oxford, Oxford University Press.

European Commission Directorate General V Report (1996), *Living and Working in the Information Society: People First* (Green Paper), http://europa.eu.int/ISPO/infosoc//egreg/docs/people1st.html

Goussal, D.M. & Udrizar Lezcano, M.S. (2000), 'Location and Marginal Impact of Multipurpose Community Telecentres: A Critical Analysis', in *Proceedings of the XIII Biennial Conference of the International Telecommunications Society, Buenos Aires*, http://www.its2000.org.ar/conference/goussal.pdf

Harris, R., Bala, P., Songan, P. & Khoo, E.G.L. (2000), 'Challenges and Opportunities in Introducing Information and Communication Technologies to the Kelabit Community of North Central Borneo', in F. Sudweeks & C. Ess (Eds), *Proceedings, Cultural Attitudes Towards Communication and Technology 2000*, Perth, Murdoch University.

Hodge, A. (2002), Remote community finds it pays to network, *Australian*, 9 May.

Ieramugadu Group Inc. (1995), *Know the Song, Know the Country: The Ngarda-Ngali Story of Culture and History in the Roebourne District*, Roebourne, Ieramugadu Group Inc.

James, D.W. & Ziebell, P. (2001), 'Western Region Network: A Case Study', in S. Marshall, W. Taylor & X. Yu (Eds), *Proceedings of the IT in Regional Areas Conference: Using Informatics to Transform Regions (ITiRA 2001)*, Rockhampton, Central Queensland University.

Kamira, R. (2002), 'Te Mata O Te Tai—The Edge of the Tide: Rising Capacity in Information Technology of Maori in Aotearoa', in S. Marshall, W. Taylor & C. Macpherson (Eds), *Proceedings of the Information Technology in Regional Areas Conference (ITiRA 2002)*, Rockhampton, Central Queensland University.

Kling, R. (1996), *Computerization and Controversy: Value Conflicts and Social Choices*, 2nd edn, San Diego, Calif., Academic Press.

——(1999), 'Can the "Next Generation Internet" Effectively Support Ordinary Citizens?', *Information Society*, vol. 15, no. 1, pp. 57–63.

Kling, R., Crawford, H., Rosenbaum, H., Sawyer, S. & Weisband, S. (2000), *Workshop Report—Learning from Social Informatics: Information and Communication Technologies in Human Contexts*, Center for Social Informatics, Indiana University, www.slis.indiana.edu/SI

McKinnon, R. (2002), 'Information and Communication Technologies and Indigenous Peoples', in S. Marshall, W. Taylor & C. Macpherson (Eds), *Proceedings of the Information Technology in Regional Areas Conference (ITiRA 2002)*, Rockhampton, Central Queensland University.

NTIA (1999), *Falling Through the Net: Defining the Digital Divide*, National Telecommunications and Information Administration, Washington, http://www.ntia.doc.gov/ntiahome/digitaldivide/

Oliver, R. & Short, G. (1996), *The Western Australian Telecentres Network: Enhancing Equity and Access to Education in Rural Communities*, http://elrond.scam.ecu.edu.au/oliver/docs/96/EM3doc.pdf

Pradhan, J. & Metcalfe, M. (2001), 'Information Technology in Nepal: What Role for the Government?', in *Proceedings of the International Conference on Information Technology, Communications and Development*, Kathmandu, Nepal, http://www.itcd.net/itcd-2001/papers/papers.html

Reeve, I. (1998), 'Telecentre Case Study: Australia', in R.P. Fucks (Ed.), *Little Engines That Did: Case Histories from the Global Telecentre Movement*, http://www.idrc.ca/acacia/engine/eng_4.htm

Rijavec, F., Harrison, N., & Soloman, R. (1995), *Exile and the Kingdom* [documentary film], Roebourne, Ieramugadu Group Inc. & Film Australia.

Riley, L.A., Nassersharif, B. & Mullen, J. (1999), *Assessment of Technology Infrastructure in Native Communities*, report prepared for the Economic Development Administration, US Department of Commerce (under award no. 99–07–13799), http://www.osec.doc.gov/eda/pdf/1G3_13_atinc.pdf

Royal Commission into Aboriginal Deaths in Custody (1991), *National Report* (Commissioner Elliott Johnston), 5 volumes, Canberra, AGPS.

Short, G. (2001), 'The Western Australia Telecentre Network', in C. Latchem & D. Walker (Eds), *Telecentres: Case Studies and Key Issues*, Commonwealth of Learning, http://www.col.org/telecentres/

Simpson, L., Wood, L., Daws, L., & Seinen, A. (2002), 'The Design and Implementation of Rural Communication Technology Initiatives:

Guidelines for Project Planners', in S. Marshall, W. Taylor & C. Macpherson (Eds), *Proceedings of the Information Technology in Regional Areas Conference (ITiRA 2002)*, Rockhampton, Central Queensland University.

Spencer, S. (2002), 'Measuring ICT Outcomes in Regional Australia', in S. Marshall, W. Taylor & C. Macpherson (Eds), *Proceedings of the Information Technology in Regional Areas Conference (ITiRA 2002)*, Rockhampton, Central Queensland University.

Trees, K.A. & Turk, A.G. (1998), 'Culture, Collaboration and Communication: Participative Development of the Ieramugadu Cultural Heritage Information System (ICIS)', *Critical Arts*, vol. 12, no. 1–2, pp. 78–91.

Turk, A.G. (2002), A Critique of Government Grant Based Approaches to Addressing Digital Divide Issues in an Australian Indigenous Community, paper presented to the Digital Divide: Technology and Politics in the Information Age conference, Hong Kong Baptist University, 22–24 August.

Turk, A.G.. & Trees, K.A. (1998), 'Ethical Issues Concerning the Development of an Indigenous Cultural Heritage Information System', *Systemist*, vol. 20, special issue, pp. 229–42.

——(1999), 'Culturally Appropriate Computer Mediated Communication: An Australian Indigenous Information System Case Study', *AI and Society*, vol. 13, pp. 377–88.

——(2000), 'Facilitating Community Processes Through Culturally Appropriate Informatics: An Australian Indigenous Community Information System Case Study', in M. Gurstein (Ed.), *Community Informatics: Enabling Communities with Information and Communication Technologies*, Hershey, Idea Group Publishing.

Venkatesan, V.S., Eversole, R., Robinson, K., & Clark, J. (2002), 'Information Access in Rural Communities: Bridging the Digital Divide', in S. Marshall, W. Taylor & C. Macpherson (Eds), *Proceedings of the Information Technology in Regional Areas Conference (ITiRA 2002)*, Rockhampton, Central Queensland University.

Watson-Verran, H. & Turnbull, D. (1995), 'Science and Other Indigenous Knowledge Systems', in S. Jasanoff, G.E. Markle, J.C. Petersen & T. Pinch (Eds), *Handbook of Science and Technology Studies*, Thousand Oaks, Sage.